

**SPECIFICATION AMENDMENTS**

Please replace paragraph [0033] of the specification with the following amended paragraph:

**[0033]** Fig. 10c shows the electrical field in the plane of the photomask for the photomask of Fig. 9a.

Please replace paragraph [0034] of the specification with the following amended paragraph:

**[0034]** Fig. 10d shows the light intensity at the surface of the photoresist for light projected through the photomask of Fig. 9a.

Please replace paragraph [0035] of the specification with the following amended paragraph:

**[0035]** Fig. 10e shows, in cross section, residual photoresist features formed on the wafer surface using the photomask of Fig. 9a.

Please replace paragraph [0038] of the specification with the following amended paragraph:

**[0038]** Figs. 13a and 13b show, in cross section, two projected photoresist features formed using the same photomask with different exposure doses.

Please replace paragraph [0057] of the specification with the following amended paragraph:

**[0057]** Turning to Fig. 7, it will be seen that masked features with interior nonprinting windows, as taught in the '436 application, transmitting light in one phase inside the masked feature and light in an opposite phase outside the masked feature, can be printed with no phase

conflict. Each masked feature F of Fig. 7 includes a window W, the window W comprising a phase shifter. Thus the windows W are assigned 180 degree phase. The transmitting area 34 35 commonly and substantially entirely surrounding the masked features F is assigned zero degree phase. Clearly the phases could be inverted if desired.

Please replace paragraph [0061] of the specification with the following amended paragraph:

[0061] In other prior art, for example Chen et al., US Patent No. 6,482,555 (hereinafter the '555 patent), several phase shifting windows are placed in close proximity to each other, with no blocking material used, as in Fig. 5b or Fig. 7 of that patent, and as shown in Fig. 9 of the present application. Turning to Fig. 9 of the present application, the transmitting area between the phase shifting areas 60 of the '555 patent has width 62. This width 62 is so small that the residual photoresist features created by adjacent shifting areas 60 merge, forming a single, large photoresist feature. Thus the transmitting area between phase shifters is nonprinting.

Please replace paragraph [0063] of the specification with the following amended paragraph (note that the period within parentheses in the third sentence of this paragraph has been deleted):

[0063] To contrast with other photomasks mentioned herein: In the present invention, a photomask comprises shifting areas immediately adjacent to nonshifting areas, with no blocking material intervening (unlike the '436 application). In aspects of the present invention, either the shifting area or the nonshifting area is nonprinting, so that opposite sides of a single closed residual photoresist feature formed by the nonprinting area merge (unlike the alternating shifting and non-shifting stripe photomask described in Lee et al.). The nonprinting area is *entirely surrounded* by an area that is printing (unlike the '555 patent-) and creates a photoresist feature

that does not merge with an adjacent photoresist feature. Fig 10a, for example, shows a plan view of a section of a photomask formed according to the present invention. The areas labeled  $180^\circ$  are shifting, while the area labeled  $0^\circ$  is nonshifting. Clearly, the phases could be inverted if desired.

Please replace paragraph [0065] of the specification with the following amended paragraph:

[0065] Fig. 10b shows the same section of photomask in cross section, the cross section taken along line L-L' of Fig. 10a. Shifting areas have been thinned to shift incident light by about 180 degrees, while nonshifting areas do not shift incident light. No blocking material separates shifting areas from nonshifting areas.

Please replace paragraph [0095] of the specification with the following amended paragraph:

[0095] The photomask of Fig. 15 can advantageously be used to pattern the pillars of Herner et al. When used for this purpose, referring to Fig. 15, photomask feature dimension  $D_1$  is between about 50 nm x S and about 160 nm x S, preferably between about 90 nm x S and about 140 nm x S, most preferably between about 130 and 140 nm x S. The shortest dimension of the transmitting window 50 is no more than about 160 nm x S. Photomask feature dimension  $D_2$ , then, is between about 210 nm x S and about 100 nm x S, preferably between about 170 nm x S and about 120 nm x S, most preferably between about 130 nm x S and 120 nm x S. With proper exposure dose, these photomask dimensions should produce photoresist features having a width of about 130 nm and separated by a gap of about 130 nm. Dose varies from design to design, photomask to photomask, and machine to machine, and it is routine to for some experimentation to be required to ~~identify~~ identify optimum dose. Preferably the width of the photoresist features is

no more than about 150 nm, and the gap is no less than about 110 nm. The photoresist features are then etched to form the patterned features, which will be pillars, as described in Herner et al. As noted in Herner et al., while the masked feature is rectangular, the cross-section of the patterned feature will tend to be substantially cylindrical. The dimensions given here assume that the light has a wavelength of 248 nm.